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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,806	05/16/2001	Masami Akimoto	OMY-010	1549

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EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/855,806

Applicant(s)

AKIMOTO ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5,7-10,12-18 and 23-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,7-10,12-18 and 23-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 9, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671).

Referring to Figure 5 and column 6, lines 20-47, and column 7, lines 50-64, Somekh et al. discloses a cluster tool apparatus used to deposit a metal layer by electrodeposition and then polish the layer by chemical mechanical polishing (CMP) in a reduced pressure environment. A central substrate-handling robot 18' (transfer mechanism, first delivering and receiving portion) transfers the substrate between the electrodeposition stations 14 (conductive film forming

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chamber) where the conductive film copper (oxidization-prone film) is deposited on the substrate, the CMP apparatus 16' (polishing chamber), the dual load lock chamber 80, the rinse/clean/dry station 82 (cleaning chamber), and the metrology station 86. In the rinse/clean/dry station 82, a combination of a brush/scrub cleaner with a centrifugal drier or a rinse bath with an isopropyl alcohol (IPA) vapor drier may be used. Alternately, drying may occur in the load lock chamber 80 (drying chamber) using a heater 98 and air jets from nozzles 100. Furthermore, a path for transferring the substrate between the transfer mechanism 18 under reduced pressure and a location (load lock chamber 80) outside the apparatus under atmospheric pressure without passing through the drying chamber is shown in Figure 5.

Somekh et al. fails to teach a drying chamber with a first and second transferring ports and a CVD chamber.

Referring to Figure 9, column 6, line 22 – column 7, line 1, and column 7, lines 36-47, Kondo et al. teaches a multi-processing chamber which includes the following units: washing unit 80, rinsing unit 90, drying unit 70 or 500, and CVD film forming unit 200. The heating and drying chamber 500 heats the wafer using infrared ray lamps 503. In addition, nitrogen gas (inert gas) is supplied drying chamber via gas blowing conduit 501. Inert gases are used drying since they do not react with wafer or chamber. After the wafer leaves the heating and drying chamber 500, wafer carrier mechanism 31a (transferring mechanism, first delivering and receiving portion) transfers the wafer into the CVD process tube 2 (CVD film form chamber operating at reduced pressure). The drying chamber 500 includes two gates G3 and G4 (first and second transferring port which allows various processing to take place before and after the drying process. In addition, an exhaust pipe 502 is connected to vacuum pump 41 is provided to

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the drying chamber 500, and therefore the drying chamber is capable of operating under a reduced pressure (col. 7, lines 45-47). Furthermore, a path for transferring the substrate between the transfer mechanism 31a under reduced pressure and a location (load lock chamber 600) outside the apparatus under atmospheric pressure is shown in Figure 8. This path is connected to the first transferring port. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh et al. with a drying chamber with first and second transferring ports and CVD chamber as taught by of Kondo et al. since this would allow processing to take place before and after the drying stage in order to yield the desired product.

4. Claims 5, 7, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) as applied to claims 1, 9, 23, and 25 above, and further in view of Hashimoto (Japanese Patent Publication 07-183299).

The teachings of Somekh et al. in view of Kondo et al. have been applied above.

Somekh et al. in view of Kondo et al. fail to teach a conductive film formed with an insulating film having a recessed portion embedded with the conductive film and a plurality of drying chambers.

Referring to the abstract, constitution, and Figure 1, Hashimoto teaches a groove (recess) formed in an insulating film 2 of a silicon substrate 1. Next, a copper film 4 is deposited over the insulating film to embed the groove. It would have been obvious to one of ordinary skill in the art at the time of the invention for the substrate of Somekh et al. in view of Kondo et al. to have

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an insulating film with groove as taught by Hashimoto. It is standard procedure to form fine copper wirings by embedding a copper film in a groove of an insulating film.

5. Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) and Hashimoto (Japanese Patent Publication 07-183299) as applied to claims 5-7 and 10 above, and further in view of Matsuskawa et al. (U.S. 5,518,542).

The teachings of Somekh et al. in view of Kondo et al. and Hashimoto have been applied above.

Somekh et al. in view of Kondo et al. and Hashimoto fails to teach a plurality of vertically stacked drying chambers.

Referring to Figure 1 and column 3, lines 12-22, Matsuskawa et al. teaches a substrate processing apparatus having a plurality of vertically stacked drying chambers. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the substrate processing apparatus of Somekh et al. in view of Kondo et al. and Hashimoto with the vertically stacked drying chambers as taught by Matsuskawa et al. By providing a plurality of vertically stacked drying chambers, more wafers are dried and hence substrate throughput is increased. In addition, the vertically stacked configuration decreases footprint, thereby minimizing the space necessary for containing the apparatus.

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6. Claims 12, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) as applied to claims 1, 9, 23, and 25 above, and further in view of Soraoka et al. (U.S. 5,855,726).

The teachings of Somekh et al. in view of Kondo et al. have been applied above.

Somekh et al. in view of Kondo et al. fail to show a first substrate carrier.

Referring to Figure 3, and column 5, lines 31-61, Soraoka et al. shows an atmospheric transfer robot 9 (first substrate carrier, second delivering and receiving portion) that moves along rail 92 to transfer samples from cassettes 12A-D to load lock chambers 4 and 5. In addition, vacuum transfer robot 10 moves samples from the load chambers 4 and 5 to the processing chamber 6 and post-treating chamber 7. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the processing chambers of Somekh et al. in view of Kondo et al. with the first substrate carrier as shown by Soraoka et al. This would allow wafers to be transferred to/from a vacuum processing chamber.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671), and Soraoka et al. (U.S. 5,855,726) as applied to claims 12, 13, and 16 above, and further in view of Henley et al. (U.S. 6,153,524).

The teachings of Somekh et al. in view of Kondo et al. and Soraoka et al. have been applied above.

Somekh et al. in view of Kondo et al. and Soraoka et al. fail to show an etch chamber.

Referring to Figure 3 and column 11, lines 2-9, lines 20-25, Henley et al. teaches that it is known to use an etch chamber in a multiprocessing apparatus. The etching chamber can etch a

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desired pattern on a substrate layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh et al. in view of Kondo et al. and Soraoka et al. with a CVD chamber and etching chamber as taught by Henley et al. This would allow substrate to be etched in order to yield the desired product.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671), and Soraoka et al. (U.S. 5,855,726) as applied to claims 12, 13, and 16 above, and further in view of DeOrnellas (U.S. 5,672,239).

The teachings of Somekh et al. in view of Kondo et al. and Soraoka et al. have been applied above.

Somekh et al. in view of Kondo et al. and Soraoka et al. fail to show resist removing chamber.

Referring to Figure 2 and column 4, lines 9-11, DeOrnellas teaches a strip module 24 (resist removing chamber) which uses oxygen plasma to strip the photoresist on the wafer. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh et al. in view of Kondo et al. and Soraoka et al. with the strip module as taught by DeOrnellas. This would allow the photoresist film to be removed after substrate processing.

9. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) and Soraoka et al. (U.S. 5,855,726)

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as applied to claims 12, 13, and 16 above, and further in view of Matsuskawa et al. (U.S. 5,518,542).

The teachings of Somekh et al. in view of Kondo et al. and Soraoka et al. have been applied above.

Somekh et al. in view of Kondo et al. and Soraoka et al. fail to teach a second substrate carrier.

Referring to Figure 1 and column 3, lines 1-11, Matsuskawa et al. teaches an apparatus having a second substrate carrier 5 perpendicularly connected to the first substrate carrier 4. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first substrate delivering and receiving portion of Somekh et al. in view of Kondo et al. and Soraoka et al. with the second substrate carrier as taught by Matsuskawa et al. By providing a second substrate carrier, throughput of various processes is increased.

Response to Arguments

10. Applicant's arguments filed September 5, 2003 have been fully considered but they are not persuasive.

Applicant has argued that Somekh nor Kondo teaches a path for transferring the substrate formed with a film in the CVD chamber using a CVD method to the first transferring port without passing through the drying chamber.

Claim 1 requires that a path for transferring the substrate between the transfer mechanism 18 under the reduced pressure and a location 80 outside the apparatus under an atmospheric pressure without passing through the drying chamber 82. Somekh et al. satisfies this requirement

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by allowing the substrate to be transferred directly to a location 80 outside the apparatus under an atmospheric pressure.

Applicant has argued that since Somekh fails to show a portion corresponding to a first and second transferring port in the dual load lock chamber 80 and that drying occurs in station 82 not chamber 80 which does not correspond to drying unit 70 and thus the combination of Somekh and Kondo is inappropriate.

In column 7, lines 60-61, Somekh et al. teaches that the drying chamber can be separate from the rinse/clean/dry station 82. Kondo et al teaches a drying chamber with a first and second transferring port. Additionally, the motivation to provide a drying chamber with a first and second transferring port is to allow processing to take place before and after the drying stage in order to yield the desired product.

Applicant has argued that a Somekh, Kondo and Soraoka fail to disclose a transferring path of the substrate after the solution type processing being performed thereon is different from the transferring path of the substrate after the vacuum type processing being performed thereon.

Somekh et al. discloses a first delivering and receiving portion 18 having a first path for a substrate to be processed with solution type processing 14 and 16. The second delivering and receiving portion of Soraoka et al. includes a second path that does not pass through a second substrate processing portion (solution type), but passes through a first substrate processing portion (vacuum type) 6. Furthermore, the second delivering and receiving portion which includes the atmospheric transfer robot section can be provided to any of the vacuum processing chambers of Somekh et al. in view of Kondo et al. in order to allow wafers to be transferred to/from a vacuum processing chamber. Thus, the combination of Somekh et al. in view of Kondo et al and Soraoka et al. satisfies the claimed requirement.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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AMC *AM*
November 20, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700